Tel/FAX: (407) 645-5881 **2308 Whitehall Drive**
E-Mail: fzelesky@aol.com **Winter Park, FL 32792**
Web Page: http://members.aol.com/fzelesky

FRANCIS ZELESKY, INCORPORATED
FRANK ZELESKY, PE, CSP, PRESIDENT
Registered Professional Engineer
Certified Safety Professional

This paper sets forth Probabilistic Risk Assessment (PRA) techniques that have been utilized to identify and quantify critical hazards, failure modes and potential human errors before they are "designed in". Applications have involved hazards such as: Fire, Explosion, Toxic Release, Nuclear Contamination, and Radiation from Outdoor Training & Biological Detection Laser Systems (Ground & Airborne).

Fault Tree Analysis (FTA) techniques are used to determine the quantitative probability of the undesired hazard occurrence (or top event) by a logical process which works its way down to the lowest significant element.

The probability of hardware failure or human error in the dangerous mode is quantified and provided as input to the FTA. A Failure Modes and Effects Analysis (FMEA) is utilized to postulate hardware failure modes at the lowest significant levels to determine the effect on the system. Human error rates and environmental effects are also modeled and quantified for input to the FTA.

Sensitivity analysis of the top event to changes in reliability (or unreliability), maintenance periods, environmental effects and human actions is used to determine ways that the probability of the top event can be reduced and therefore lower the risk of accident. The final Design Hazard Analysis contains a quantified risk assessment along with risk reduction alternatives to influence the management decision process.

Ways in which the process can be applied to High Energy Laser Systems will be illustrated.

Tel/FAX: (407) 645-5881 **2308 Whitehall Drive**
E-Mail: fzelesky@aol.com **Winter Park, FL 32792**
Web Page: http://members.aol.com/fzelesky

FRANCIS ZELESKY, INCORPORATED
FRANK ZELESKY, PE, CSP, PRESIDENT
Registered Professional Engineer
Certified Safety Professional

Mr. Zelesky, has been the President and Principal Consultant with Francis Zelesky, Inc. for the past 10 years. He is a Certified Safety Professional (CSP) - System Safety, and a Registered Professional Engineer (PE) in Florida. He has a BS in Engineering, has completed many graduate and CEU courses in his areas of specialization and has been an Adjunct College Instructor. He entered the System Safety/Reliability field 20 years ago and progressed to Product Assurance Manager and Principal Investigator for System Safety - Reliability Projects in support of the U.S. Army at a leading engineering services firm where he staffed/supervised professionals, provided technical guidance, innovative techniques, and coordinated efforts for programs in the conceptual, development, design and manufacturing phases of the system engineering process. He instituted the System Safety and Reliability Engineering functions at that location. Before entering the System Safety and Reliability field, he was a System Design-Analysis Engineer in Instrumentation, Controls & Communications for 20 years.

Professional affiliations include: System Safety Society (SSS) (founding president of Florida chapter), American Society of Safety Engineers (ASSE), National Fire Protection Association (NFPA), National Society of Professional Engineers (NSPE), Institute Of Electrical & Electronics Engineers (IEEE), Instrument Society of America (ISA), American Institute Of Chemical Engineers (AIChE), and the Laser Institute of America. (LIA).